AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

1-8. (Cancelled)

9. (New) An ink jet head driving apparatus comprising:

an ink jet head having a pressure chamber which contains ink, a nozzle communicating with the pressure chamber, through which the ink in the pressure chamber is ejected in the form of a droplet to a recording medium, and an actuator which changes a capacity of the pressure chamber to be expanded or contracted; and

a drive signal generating unit which outputs a drive signal including a first, second, third and fourth pulses sequentially applied to the ink jet head for ejecting one ink droplet by the actuator, the first pulse having a first rectangular wave which expands the capacity of the pressure chamber, the second pulse having a second rectangular wave which contracts the capacity of the pressure chamber, the third pulse having a third rectangular wave which expands the capacity of the pressure chamber, and the fourth pulse having a fourth rectangular wave which contracts the capacity of the pressure chamber,

wherein both a first time interval between centers of pulse widths of the first and third pulses and a second time interval between centers of pulse widths of the second and fourth pulses are respectively set to half of an acoustic resonant cycle of the ink in the pressure chamber.

10. (New) An ink jet head driving apparatus according to claim 9, wherein a first ratio of the pulse widths of the first and third pulses and a second ratio of the pulse widths of the second and fourth pulses are determined, respectively, according to a damping rate of residual vibration of the ink in the pressure chamber.

11. (New) An ink jet head driving apparatus according to claim 9, wherein the pulse widths of the first and third pulses are set to be equal to one another and the pulse widths of the second and fourth pulses are set to be equal to one another, a third ratio of voltage amplitudes of the first and third pulses and a fourth ratio of voltage amplitudes of the second and fourth pulses being determined, respectively, according to a damping rate of residual vibration of the ink in the pressure chamber.

12. (New) An ink jet head driving apparatus according to claim 9, wherein the drive signal generating unit sequentially generates a plurality of the drive signals so that the ink jet head ejects a plurality of the ink droplets resulting in adherence at one point on the recording medium, whereby one pixel is formed.

13. (New) An ink jet head driving apparatus comprising:

an ink jet head having a pressure chamber which contains ink, a nozzle communicating with the pressure chamber, through which the ink in the pressure chamber is ejected in the form of a droplet, and an actuator which changes a capacity of the pressure chamber to be expanded or contracted; and

a drive signal generating unit which outputs a drive signal including a first, second, third and fourth pulses sequentially applied to the ink jet head for ejecting one ink droplet by the actuator, the first pulse having a rectangular wave which expands the capacity of the pressure chamber, the second pulse having a second rectangular wave which contracts the capacity of the pressure chamber, the third pulse having a third rectangular wave which has a pulse width of a predetermined rate with respect to a pulse width of the first pulse, and expands the capacity of the pressure chamber, and the fourth pulse having a fourth rectangular wave which has a pulse width of a predetermined rate with respect to a pulse width of the second pulse, and contracts the capacity of the pressure chamber,

wherein a sum of the pulse widths of the first and second pulses is constant, and a rate of the pulse widths of the first and second pulses is obtained as a value according to a desired ejection volume.

14. (New) An ink jet head driving apparatus according to claim 13, wherein the drive signal generating unit sequentially generates a plurality of the drive signals so that the ink jet head ejects a plurality of the ink droplets resulting in adherence at one point on a recording medium, whereby one pixel is formed.

15. (New) An ink jet head driving apparatus comprising:

an ink jet head having a pressure chamber which contains ink, a nozzle communicating with the pressure chamber, through which the ink in the pressure

chamber is ejected in the form of a droplet, and an actuator which changes a capacity of the pressure chamber to be expanded or contracted, and

a drive signal generating unit which selectively generates a first drive signal and a second drive signal, each of which is output to the ink jet head for ejecting one ink droplet by the actuator, according to a desired ejection volume of the ink droplet,

wherein the first drive signal includes a first, second, third and fourth pulses sequentially applied to the ink jet head for ejecting one ink droplet by the actuator, the first pulse having a first rectangular wave which expands the capacity of the pressure chamber, the second pulse having a second rectangular wave which contracts the capacity of the pressure chamber, the third pulse having a third rectangular wave which expands the capacity of the pressure chamber, and the fourth pulse having a fourth rectangular wave which contracts the capacity of the pressure chamber,

wherein both a first time interval between centers of pulse widths of the first and third pulses and a second time interval between centers of pulse widths of the second and fourth pulses are respectively set to half of an acoustic resonant cycle of the ink in the pressure chamber,

wherein the second drive signal includes a fifth and sixth pulses sequentially generated with a predetermined wait time therebetween, the fifth pulse having a fifth rectangular wave which expands the capacity of the pressure chamber, and the sixth pulse having a sixth rectangular wave which contracts the capacity of the pressure chamber, and

wherein a time interval between centers of pulse widths of the fifth and sixth pulses is set to the acoustic resonant cycle.

16. (New) An ink jet head driving apparatus according to claim 15, wherein the drive signal generating unit maintains a sum of the pulse widths of the first and second pulses of the first drive signal at a constant value, and varies a ratio between the pulse widths of the first and second pulses to change a volume of each ink droplet to be ejected from the ink jet head.